

ASARCO Ray Operations
Aquifer Protection Permit No. P-100525
Place ID 9676, LTF No. 90608
Significant Amendment

I. Introduction:

The Arizona Department of Environmental Quality (ADEQ) proposes to issue an Aquifer Protection Permit (APP) for the subject facility that covers the life of the facility, including operational, closure, and post-closure periods unless suspended or revoked pursuant to Arizona Administrative Code (A.A.C.) R18-9-A213. The requirements contained in this permit will allow the permittee to comply with the two key requirements of the Aquifer Protection Program: 1) meet Aquifer Water Quality Standards (AWQS) at the Point of Compliance (POC); and 2) demonstrate Best Available Demonstrated Control Technology (BADCT). BADCT's purpose is to employ engineering controls, processes, operating methods or other alternatives, including site-specific characteristics (i.e., the local subsurface geology), to reduce discharge of pollutants to the greatest degree achievable before they reach the aquifer or to prevent pollutants from reaching the aquifer.

II. Permittee

ASARCO LLC.

III. Facility Name & Location:

ASARCO Ray Operations
27809 N. Mineral Creek Road
Kearny, Arizona 85137

IV. Facility Description:

The ASARCO LLC (ASARCO) Ray Operations are located in eastern Pinal County, along State Highway 177, approximately ten miles to the north of Kearny. The site consists of an open-pit mine and associated leach and barren rock deposition areas (RDAs), a mill that produces concentrate, a solvent extraction-electrowinning (SX-EW) plant that produces electrowinned copper cathodes from the leaching operations, and a tailings deposition facility for storage of tailings produced during the flotation process at the Ray Concentrator. Underground mining activities began in the area around 1880, and continued periodically until the mid-1940's. The Ray Mine has been in operation since 1911. In 1948 the Kennecott Copper Company (Kennecott) consolidated the remaining mining operations and began the development of the open-pit mine. ASARCO purchased the mine from Kennecott in 1986. The Ray porphyry copper deposit lies within the historical drainage of Mineral Creek, which bisected the deposit until late 1972. The water within the creek was diverted around the mine via an 18,181 foot long man-made diversion tunnel, which was driven into the Dripping Springs Mountain Range located to the east of the mine. A 13,300 foot extension of the diversion tunnel was completed in 2002, to better isolate the waters of Mineral Creek from mining, milling, and leaching operations.

The copper sulfide ores mined at the Ray Mine are taken to one of two crushing facilities on-site, and then conveyed to the Ray Concentrator or shipped off-site by rail to the Hayden Concentrator for milling to produce concentrates for smelting. The remaining material consists of leach rock

material and barren rock. The leach rock material is taken to prepared RDAs and leached, and barren rock is hauled to separate RDAs where no leaching presently occurs.

The RDAs are typically constructed by end-dumping ore from trucks in 25 to 100 foot lifts. Ultimate RDA heights may exceed 1,000 feet. Leach solution (raffinate) is applied to the RDAs by flooding bermed cells on top of the RDAs; or spraying, trickling, or dripping solution onto the top of the RDAs. Solution can also occasionally be applied to an RDA face. Raffinate percolates through the RDA, reacting with the copper bearing ores, and ultimately flows out the toe of the RDA as pregnant leach solution (PLS). The PLS is captured by a downgradient collection system, typically an impoundment, and piped to the SX-EW Plant for the production of electrowinned copper cathodes.

Operational facilities, such as ditches and catchments, are integral parts of the RDAs and serve to manage process fluids within the RDAs. These facilities are transient in nature and move in conjunction with the lateral or vertical expansion of the RDA, as well as changing patterns of raffinate application. Moreover, during their existence, these facilities typically have variable liquid levels based on evaporation rates, impoundment elevation, rock placement, and raffinate application rates. The facilities may contain stormwater, process contact water, PLS, raffinate, or any combination thereof. ASARCO refers to these facilities as Dynamic Solution Management Facilities (DSMFs). These facilities exist only on permitted RDAs and are considered part of the RDAs for permitting purposes, rather than being separately permitted.

The permitted facilities include 8 RDAs (incorporating the associated DSMFs); 29 primary and secondary process solution impoundments; 7 non-stormwater impoundments; 3 truck-wash facilities; 1 tailing impoundment; 1 non-municipal solid waste landfill; and 22 formerly used detention ponds.

V. Amendment Description:

The purpose of this amendment is for the following reasons:

1. Incorporate the West Pit into the 2 Series Rock Deposition Area (RDA) (B2RDA) to allow for leaching and Run of Mine dumping. The purpose of this modification is to allow ASARCO to start in-pit dumping and, in the future, in-pit leaching of low grade ore in the West Pit, similarly to what is currently being done at the 5-Series RDA. Leachate solutions will be collected in ponds down gradient to the low-grade stockpiles. The facility will be entirely located in the current hydrological sink of the pit. The elevation of the new leaching operation will not exceed the current elevation set in the permit for the 2-Series RDA.
2. Access road for the 5 Series RDA (A5RDA) to be incorporated into future pit for mining operations (above max crest of 3,000 feet (ft)). The purpose of this modification is to allow ASARCO to incorporate an exploration road and future haulage road into the 5-Series RDA, because the material that was used to construct the road is not inert material. No leaching will take place on the material that was used for road construction, since the purpose was to increase stability of the road. This access road to the future expanded pit facility will exceed the 3000 ft. limit set in the permit for the 5-Series. Therefore, ASARCO requests an exclusion for only this area to the permit. The area to the south and southeast

of the access road will become, in the future, part of the expanded Calumet Pit and any runoff will report to the pit when mined in the future.

3. Minor modification to 8-series RDA footprint boundary on exhibit (attached as Figure 19 B-2 in the application) to reflect better accuracy of where the toe of slope is as shown in aerial mapping. No changes were necessary in the permit.
4. Modify permit to reduce the frequency from quarterly to semi-annual groundwater monitoring for Beryllium in POC Wells R18, R19, and R-22, for Cadmium in POC Wells R-4A, R-19, and R-22, and for Lead in POC Wells R-2, R-2A, R-3, R-4A, R-18, R-19, and R-22. These reductions are due to a history of non-detect results over a ten-year monitoring period.
5. Removal of Tank No. 11 (C46) from APP. Tank No. 11 meets the requirements for a tank exemption as per ADEQ's substantive policy.
6. Retention Pond (C35) volume calculations.
7. Updated closure and post-closure costs.
 - Updated closure costs were provided for the expanded 2 Series and 5 Series RDA facilities. The costs were updated applying a percent increase in cost based on the percent increase in the expanded footprint of the RDAs. Using this approach, the closure cost increased by \$556,907.49.
8. Minor modification to existing language in current permit to remove reference to a pumpback system for 7C Dam (Section 2.2.1.3.4 of the APP) and Stacker Dam (Section 2.2.1.38) below. This reference is removed and has been revised to clarify where the pumpback system is actually located. There is a series of lined and unlined impoundments and concrete channels (associated with the Mineral Creek concrete lined channel), that have been in place for over 20 years, collecting surface and sub-surface flows and overflows from these facilities and discharges to the Retention Basin (C35) where the pumpback system is located.

This application was processed as a "significant" amendment as per the following:

- A.A.C. R18-9-A211(B)(8) – related to addition to or a substantial change in closure requirements or to provide for post-closure maintenance and monitoring. See Item No. 7 above.
- A.A.C. R18-9-A211(B)(9) – related to material and substantial alterations or additions to a permitted facility, including a change in disposal method, justify a change in permit conditions. See Item No. 1 and No. 5 above.

VI. Regulatory Status:

ADEQ was informed by ASARCO personnel that pregnant leach solutions (PLS) spill had occurred on July 9, 2019 at the 7A dam bypass line. Based on subsequent email communication from ASARCO on August 7, 2019, the required corrective action including removal of impacted soils was completed. ADEQ determined that no further action was required.

The most recent inspection was conducted on October 17, 2019. During the inspection, issues related to integrity of the liners and anchor trenches were noted for Facilities B5, C1 and C38. A notice of correction (NOC) was issued on October 23, 2019, and closure for the NOC was issued on January 21, 2020.

VII. Best Available Demonstrated Control Technology (BADCT):

The Ray Operations are divided into three sub-areas: A, B, and C. Sub-area B consists of the area underlain by the capture zone, characterized as the “passive containment” created by the Ray open pit. Sub-area A is the mine area located hydrologically upgradient of the passive containment, and Sub-area C is the mine area located hydrologically downgradient of the passive containment. BADCT has been determined in accordance with the ADEQ Arizona Mining BADCT Guidance Manual.

The passive containment created by the Ray open pit has been deemed to satisfy the requirements of A.R.S. § 49-243(G). The passive containment created by the open pit is hydrologically isolated to the extent that it does not allow pollutant migration from within the capture zone. This passive containment is an integral part of the BADCT for all facilities located within Sub-area B, which is defined by the capture zone. Due to the isolated nature, within the Mineral Creek Basin, any groundwater flow originating from Sub-area A will flow into the capture zone of the passive containment created by the open pit, and the passive containment is therefore also an integral part of the BADCT for the facilities located within Sub-area A. BADCT evaluation of the existing facilities located in Sub-area C involved the following factors:

- Current discharge control technology (DCT) and site factors;
- Aquifer loading;
- Technically feasible alternative DCTs; and,
- Cost vs. discharge reduction.

BADCT is supplemented by a required inspection and maintenance program, and groundwater monitoring at the applicable points of compliance.

VIII. Compliance with Aquifer Water Quality Standards (AWQS):

Compliance with AWQS is required at the POCs listed in Table 3 Point of Compliance. The Facility shall monitor groundwater quarterly, semi-annually, and biennially for the parameters listed in Tables 15, 16, and 17 respectively in the Permit. An updated Pollutant Management Area (PMA) map was provided under this amendment in the Application Figure 19B-2.